

The Russell Self-Piloted Check Valve



New Check Valve Increases Productivity in Oil Well Operations

A new check valve has been designed and tested that can be used in two modes. One mode is on a high-flow rate production well to allow the well to be worked over to replace or repair electric submersible pumps. The second mode is on an injection well to allow enhanced reliability and remote operation. Sanford and Russell Associates, with the aid of a grant from the Department of Energy's Inventions and Innovation Program, designed and tested the Russell self-piloting check valve. After the device was successfully tested, it was licensed to Weatherford International, Inc., who has incorporated it into two valves.

The Formation Saver Valve (FSV) is installed below electric submersible pumps (ESPs) when the well must be periodically worked over to replace failed ESP pump sets. The main application of the FSV is to prevent fluid loss and associated formation damage when the ESPs are being worked on. As well as reducing the impact of fluid loss on well deliverability, the FSV significantly reduces the cleanup times when the well is returned to production. By providing an immediate and effective reservoir isolation barrier, the FSV also reduces the overall duration of workover operations.

The Self-piloting Injection Valve (SIV) is the reverse of the FSV. SIVs are used to inject fluids in low rate wells or to remediate after safety valve failures. The SIV overcomes the problems that traditional retrievable injection valves have with pressure loss through the valves and sensitivity to changes in injection flow rate. The SIV avoids the need to accurately anticipate injection rates and to change out the valves because the SIV is non-flow-rate dependent. The SIV is more reliable than traditional valves and requires no control line, thus reducing cost and wellhead complexity.

Overview

- ◆ Developed by Sanford and Russell Associates and commercialized by Weatherford International Ltd.
- ◆ Commercialized in 1991
- ◆ Currently used in more than 100 wells

Applications

- ◆ High flow rate wells during workover
- ◆ Injection applications for enhanced reliability

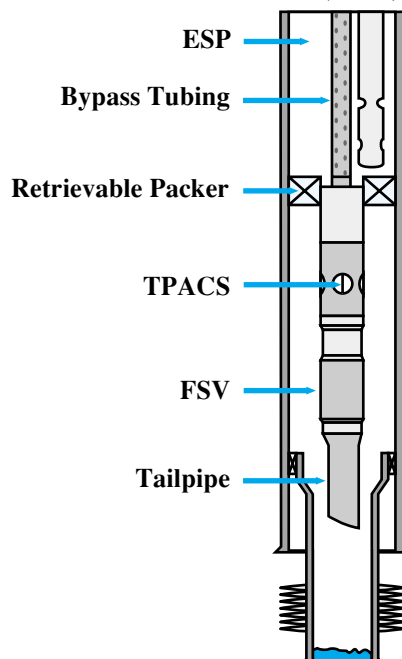
Capabilities

Provide flow control technology to get oil wells on line more effectively and to maximize production.

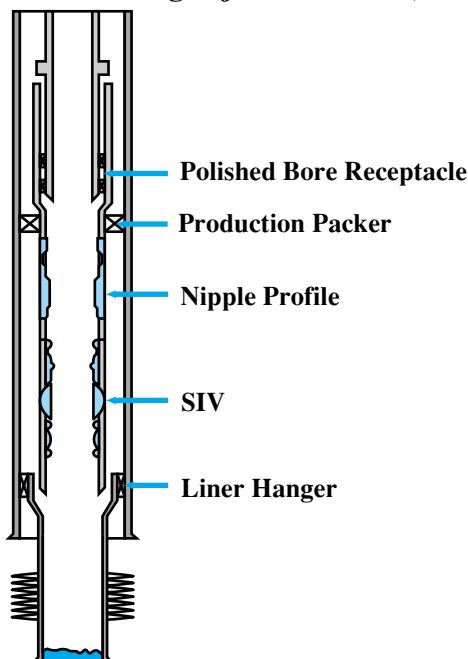
Benefits

- ◆ Increases well production potential.
- ◆ Reduces workover complexity and duration.
- ◆ Increases pump operating days per year.
- ◆ Retrievable installation.

Formation Saver Valve (FSV)



Self Piloting Injection Valve (SIV)



Weatherford Valves Using the Russell Self-Piloted System